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TROPICAL ABSCESS OF THE LIVER
IN THE STRAITS SETTLEMENTS,
WITH NOTE OF FIFTEEN CASES.

Thesis for the degree of M.D.

by

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TROPICAL ABSCESS OF THE LIVER IN THE STRAITS
SETTLEMENTS, WITH NOTES OF FIFTEEN CASES.

In this thesis I propose to deal with the so-called solitary abscess of the liver as it occurs in the tropics, and not with hepatic abscesses due to pyaemia, or secondary septic infections from other foci of disease, such as may occur following appendicular abscess, or other lesions in the stomach, bowel, gall-bladder or pelvis. Nor do I include abscesses following an injury to the liver, or in connection with hydatid disease. An experience of general practice in the Straits Settlements, extending over twelve years, goes to prove that liver abscess is fairly common in that part of the world, though Scheube (1) says that "a few tropical regions such as Singapore are free of it". During the last twelve years I have had fifteen cases of liver abscess under my care in Penang, which has a European population of about five hundred and a native population of over ninety thousand, of whom only a small proportion have adopted European methods of treatment. The average annual admission rate of such cases to the General Hospital, Penang, has been from three to five cases, whilst in Singapore with a population of about a hundred and fifty thousand, from/

from twelve to fifteen cases have been admitted yearly to the General Hospital there. These figures do not include cases occurring in the troops which are treated in the military hospitals, nor cases admitted to the Pauper Hospital, Penang or to the Tan Tock Seng Hospital, Singapore. A certain number of cases undoubtedly occur amongst the Chinese and other natives, who are treated by their own doctors and priests. Cases of liver abscess are also not uncommon amongst the planters in the Federated Malay States, and these cases have been more frequent during the last four or five years, since the enormous spread of the rubber-growing industry has attracted to the country a rapidly increasing number of Europeans of an age between twenty and forty-five, which seems to be the most favourable time for the development of this disease. This is not to be wondered at, when one considers that the conditions of a planter's life are such as to expose him to greater risks from sun-stroke, from chills either after perspiring profusely, or after being soaked with rain, and from drinking contaminated water, than fall to the lot of the dweller in towns where the water supply is good, and where there is no necessity for one to be exposed either to the sun or to rain.

Predisposing/

Predisposing Causes. Statistics and observation in all parts of the tropics have shown that abscess of the liver occurs much more frequently in Europeans than in natives, and very much more frequently in European men than in European women and children. Of my sixteen cases, nine were European, five were Chinese, one Japanese and one Malay in a population of five hundred Europeans and over ninety-thousand natives. In the whole series there was only one female patient, and with the exception of a boy, aged fifteen, and a man of sixty-five all my cases occurred in patients whose ages ranged from twenty to forty-five, and it is this period of life which as Morehead (2) says, seems to be the most usual time for the development of this disease. Fayrer(3) remarks :- "The annual report of the Sanitary Commissioner with the army of India for 1890 says - 'on comparing the statistics of the native army with those of the European it will be found that, in the year under review, the death rate of the Europeans from Hepatic abscess was about thirty-five times higher than that of the natives of India, it having been twenty-five times higher in the two preceding years, also that hepatic abscess contributed 7.6 % of all the deaths of European soldiers but only 0.2 % /

C.2 % of the deaths of native soldiers-"

Buchanan(4) reports that during the years from 1893 - 1896 there were 7972 cases of dysentery amongst the European soldiers in India with 441 cases of liver abscess; there were 79723 cases of dysentery and 127 cases of liver abscess between 1892 and 1896 amongst native soldiers and prisoners. The figures demonstrate that amongst Europeans there was one case of liver abscess to every eighteen cases dysentery, whereas amongst the natives the proportion was only one case of liver abscess to 628 cases of dysentery. Charles (5) says that the native soldier in India gives a ratio of 5.2 for dysentery and diarrhoea, to one of 35 for the same diseases amongst European soldiers. The native is seventeen times less liable to hepatitis, and twenty-five times less liable to hepatic abscess than the European.

In India in 1907 the death rate due to liver abscess was twenty-one times higher amongst British than amongst native troops. Amongst British troops, during five years there were 5531 cases of dysentery and 860 cases of liver abscess, as against 23516 cases of dysentery and 72 cases of liver abscess amongst the native troops. The Sanitary Commissioner, in his note on the health of the jail population, shows/

shows that in the Indian jails in the last five years there have been 42152 cases of dysentery and four cases of abscess of the liver, and in the Native Army 23516 cases of dysentery and 72 cases of abscess of the liver. On the other hand, among British soldiers during the five years there were 5581 cases of dysentery and 360 cases of abscess of the liver, so that there must be some other condition besides dysentery operative among Europeans.

This is a very great disproportion, but it is fully borne out by one's experience in private practice in the Straits, and by the experience of the Government medical officers in charge of the hospitals there. What is the cause of this disproportion? Is it because the native has acquired a partial immunity to the disease, or is there anything in his mode of life or his diet that render him less liable to develop tropical abscess of the liver than Europeans? Charles (6) thinks that the cause is that :-

- I. The liver of the European is handicapped by tropical conditions of life.
2. This induced vulnerability causes it to fall a more facile victim to micro-organisms, and suppuration/

suppuration is more easily set up therein ;

3. Hepatic congestion and irritations are the prime predisposing causes, i.e. the necessary antecedent of abscess must be an inadequacy of the liver to cope with the work thrown on it. The liver of the native, he says, is more specialized to the conditions of his life, and he is therefore less likely to develop liver abscess. Pilgrim (7) believes that the British habits of taking alcohol, eating meat freely, and perhaps eating too much, afford a sufficient explanation of the want of relation between the incidence of dysentery and hepatic abscess in the British and native armies, and in support of his view he refers to the extreme rarity of hepatic abscess in European ladies, although they suffer frequently from dysentery.

In the Straits the native diet consists largely of rice flavoured with various spices and curry-stuffs, and only a very small quantity of proteid food. At each of their two daily meals, usually eaten about 11 a.m. and 6 p.m. every member of the family has a large plate of rice served to him, whilst in the centre of the table are placed small dishes containing a little fish, eggs, chicken, duck and in the case of the chinese, pork. The rice is eaten in large handfulls/

handfulls, and with each bolus of rice a small portion of meat or egg is mixed. His rice is washed down with weak Chinese tea or coffee and he is always most abstemious in the use of alcoholic liquors, drinking only a little brandy on special occasions, such as wedding feasts and New Year days. Contrast this diet with that of the European, especially with that of the new arrival in the country, who usually has three full meals a day each of which consists largely of meat. He acts on the theory that as the beef and mutton are said to be much less nutritious than they are at home, he must eat a large quantity to get the requisite amount of nourishment out of it. Beer is generally recognised as being likely to upset the liver, and non-alcoholic drinks are said to be "lowering to the system" so whisky must be drunk. Now whisky in small quantities well diluted with some mineral water is probably not so injurious, but unfortunately in many cases the quantity is not small, and there is also a considerable consumption of more concentrated drinks in the form of gin and bitters, and it is not unusual to find that on carefully adding up his allowance, a man is consuming the equivalent of a half to three quarters of a bottle of whisky daily. Add to this the constant high temperature

temperature, on an average about 85' to 90' in the shade all the year round, and a disinclination for active exercise, since any exertion causes profuse perspiration, and we get a condition of affairs rapidly giving rise to congestion of the liver and rendering it liable to the attacks of any organism.

This, then would account for the greater liability of Europeans to develop liver abscess and for the greater number of cases occurring in European males, since women do not generally consume so much alcohol, they eat less and are less likely to be exposed to chills than men are. European children though subject to dysentery, rarely if ever suffer from abscess of the liver, and of course their diet contains less proteid food than that of the adult and no alcohol.

In my series of cases none of the patients except the Chinese boy were total abstainers, five were moderate drinkers whose consumption of alcohol varied ^{one} from _aounce of brandy to four ounces of whisky daily whilst all the others including the female case imbibed freely up to the equivalent of three quarters of a bottle of whisky daily. Rogers(3) also reports that in 50 % of his cases there was a distinct history of over-indulgence in alcohol, so that I think/

think we may reasonably assume that congestion of the liver, set up by an excessive consumption of alcohol is one of the most fertile predisposing causes of tropical abscess of the liver.

Exciting Causes.

The ordinary tropical abscess of the liver is essentially a tropical disease, and occurs very rarely in a temperate climate, though an individual who has resided in the tropics may develop the disease after his return to a colder region, and in almost every case careful enquiry elicits a history of a previous attack or attacks of dysentery. These attacks may assume a very mild form, in which the symptoms are so slight that the patient is scarcely conscious that he has suffered from dysentery.

He may tell one that he has been subject to slight attacks of diarrhoea, that he has never passed any typically dysenteric stools, and that the trouble has been cured by a dose of castor oil or by a few drops of chlorodyne or laudanum. On the other hand one may get a history of one or more acute and severe attacks of dysentery, or what is more frequent still, a history of chronic looseness of the bowels subject to acute exacerbations as the result of exposure to cold and wet, indiscretions in diet/

diet, and the abuse of alcohol. In all my cases with the exception of one I got a history of dysenteric attacks varying in severity. The one exception was a Chinese boy who did not remember having had anything of the sort and whose parents could give no accurate history of his previous illnesses, but as dysentery is very common in Chinese children who eat viands and eat concoctions purveyed by native hawkers, and which have been proved more than once to be responsible for epidemics of typhoid fever, it is probable that he had suffered at some time from a mild attack of the disease. The period of time elapsing between the beginning of the attack of dysentery, and the development of the first signs of liver abscess may vary greatly. In my series of cases two patients (cases I and VII) were found to be suffering from liver abscess whilst in two other cases (IV and XIII) at least a year had elapsed since the dysentery had apparently been cured. This is a common experience and would show that one cannot be too careful in one's prognosis of cases of amoebic dysentery. Dysentery would therefore, appear to be the most common precedent of tropical abscess of the liver, and especially would it appear from my series of cases, that it is more likely to occur after the subacute forms/

forms of dysentery which tend to become chronic, rather than after the very acute variety, which is the more common in natives and which either kills the patient in a few days, or after running an acute course rapidly disappears, leaving the patient without any symptoms of chronic dysentery. What then accounts for the more frequent occurrence of abscess of the liver after the less acute attacks of dysentery, than after the more severe forms of the disease?

Research has shown that the cause of the subacute, or more chronic form of dysentery is most frequently the *Entamoeba histolytica*, which can almost invariably be found in the pus from cases of tropical abscess of the liver, whilst the more acute and severe form of dysentery is usually due to Shiga's bacillus.

The weight of evidence points very strongly to the amoeba being the cause of tropical abscess of the liver. Thus, Rogers found amoeba in thirty-five consecutive cases of liver abscess, in a scraping taken from the wall of the abscess at the time of operation, and in two-thirds of these cases the pus was sterile when the abscess was opened. Dysentery of the amoebic type was present in 90 % of cases in which clinical and post-mortem evidence was obtained, though/

though it was often latent in character. He gives the following results of cultures of liver abscess pus at the time of operation, or post-mortem in unopened abscesses.

Sterile	36	-	80 %
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Cocci present	9	-	20 %
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After operation -

Sterile	8	-	25 %
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Cocci present	24	-	75 %
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Therefore he concludes that the great majority of tropical amoebic abscesses of the liver are primarily free from bacteria, but that staphylococci and streptococci are frequently present after the operation.

In many cases the staphylococci are of a mild type and only delay the healing, but if the cocci be virulent the temperature keeps up and the patient slowly sinks. Mixed postoperative infection is a serious factor in causing death, and must be avoided if possible though it is difficult to do so in warm damp climates and especially with native patients.

Bose (8a) reports 52 cases of liver abscess and in 22 of these there was a history of dysentery.

Marchoux (9) infected 82 cats with dysentery,
Of/

Of these 52 died with abscesses of the liver. All the abscesses contained living Amoebae, and in addition 23 contained staphylococci, 17 anaerobic bacteria, 6 bacilli of the colon group, 4 streptococci and 2 proteus vulgaris. He also examined 26 human liver abscesses and found that in two cases the pus was sterile, in 14 staphylococci were present, in 6 anaerobic bacteria, in 4 bacillus coli and 2 streptococci. In 17 cases amoebae were found and in three cases no amoebae were found in the pus though they were present in the stools.

He thinks that -

1. Liver abscesses always contain some bacteria at the start;
2. later they become aseptic owing to the extermination of the bacteria which gave rise to them;
3. and the amoebae convey the bacterial infection from the intestine to the liver.

Dopter (10) states that probably the amoebae stop the flow of the blood in the capillaries of the liver, and form necrotic infarcts in which bacteria develop.

McLeod found that dysentery was present or was recognised post-mortem in practically every case of liver abscess.

Saundby and Miller (11) report a case of amoebic dysentery/

dysentery with liver abscess in a patient who had never been out of England. Amoebae were found in ulcers in the bowel, and inside the blood vessels and bile ducts in the liver, but the pus from the abscess gave no growth on inoculating ordinary media.

Kartulis (12) believes that the amoeba reaches the liver from a dysenteric lesion in the wall of the bowel through the portal vein, and probably carries in its body other organisms which can give rise to suppuration e.g. staphylococci and streptococci. A writer, in Davidson's Diseases of Warm Climates, records a case in which he found staphylococcus pyogenes aureus in large numbers in the pus of a liver abscess immediately after operation. No amoebae were found but cultures on agar-agar, potatoes and gelatine showed a growth of staphylococcus pyogenes aureus only, whilst subcutaneous injections of pure cultures into rabbits caused abscesses. He therefore thinks that in this case at least the staphylococcus aureus had undoubtedly produced the suppuration. He concludes that there two ways in which the cocci may find their way from the intestine into the liver, (1) from an ulcerated intestine, or (2) through the bile channels when obstructed and diseased/

diseased. Scheube reports that staphylococci, streptococci, diplococci, bacillus coli communis and bacillus pyocyneus have all been found in the pus of hepatic abscesses, partly in pure culture and partly combined. In some cases the pus, especially in old abscesses, was found to be sterile, the microorganisms dying out when the abscesses were of long standing.

Other protozoa have been found in the pus of hepatic abscesses. Grimm (13) in an indigenous case of liver and lung abscess found numerous motile flagellae besides many bacteria, and Manson found an infusorium, resembling Balantidium coli and provided with cilia, in pus from a case in which the abscess had broken through the right lung. One authority (14) remarks that amoebae only may be present, and the pus otherwise sterile. In other cases streptococci, staphylococci, Bacillus Proteus, Bacillus Coli Communis and bacilli like typhoid bacilli have all been found.

Rogers (15) reports that he found amoebae in scrapings taken from the abscess wall at the time of operation in sixteen out of seventeen cases examined. If pus only was taken the amoebae were found in four out of twenty-two cases. A scraping of the wall examined twelve days after the operation contained no amoebae/

amoebae. He never failed to find amoebae in the walls of abscesses opened post-mortem. His conclusion again is that the amoeba is the only constantly found organism in tropical abscess of the liver, that pyogenic organisms are only exceptionally found and when present are not necessarily virulent.

He thinks that the amoeba may die out in old standing cases, and quotes a case in which three abscesses were found. In two of the abscesses, amoebae were present in large numbers, but in the third and oldest abscess no amoebae could be found. This may possibly count for the fact that various observers have failed to find amoebae in cases of liver abscess which have been sent home from the tropics for operation. Some authorities argue that the amoebae bring cocci from the intestine with them and these cause the suppuration and die out before the abscess is opened, but frequently the most acute and wide spreading abscesses contain no pus forming organisms. Rogers, therefore, maintains that the amoeba by itself does as a rule cause tropical abscess of the liver without the help of any organisms of a bacterial nature.

He has got evidence of dysentery in 95.83 % of his cases of liver abscess, and says that dysentery is/

is constantly, or almost constantly associated with tropical liver abscess, and that the amoebae was found in the dysenteric ulcers in all the cases he examined. He maintains that amoebic dysentery alone, sets up amoebic liver abscess though other forms of dysentery may cause pyaemic abscess of the liver. Rogers questions whether the amoeba reaches the liver through the portal vein, but thinks it may do so by passing through the wall of the bowel into the peritoneum where the circulation carries it to the large lymphatics under the diaphragm, and thence it makes its way into the liver.

Anderson (16) also publishes statistics, and submits that the amoeba is not an important factor in causing liver abscess in Port Blair and Eastern Bengal, but here again the most prevalent form of dysentery is probably the bacillary. The same argument holds good in the cases occurring during the South African War when the type of dysentery was repeatedly proved to be bacillary.

Kartulis (17) failed to find in 33 % of cases, (a) any history of dysentery, (b) any trace of intestinal lesions, and (c) any amoebae in wall of liver abscesses, and believes that liver abscess is produced/

produced not by amoebae but by pyogenic organisms. In 1903 in Hong Kong in four out of five cases of liver abscess there was not trace of dysentery and no amoebae were found in the pus or in the abscess wall. In the army records for 1903 - 5 out of eighty-two post-mortems of fatal cases of liver abscess the gut was normal in 63.

Duncan (18) gives an account of eighty-six post-mortems on cases of liver abscess in 1900. Forty showed no signs of dysentery. In 453 cases from 1896 - 1900 there was no evidence of dysentery in 53 %. In 161 cases of single abscess 41 % showed ulceration and 59 % showed none. In 238 cases of associated dysentery, the liver abscess was single in 28 % and multiple in 72 %. He remarks that in the West Indies, where dysentery is common, liver abscess is rare, and that, in the South African War, amongst an enormous number of dysentery cases liver abscess was scarcely met with.

Buchanan (19) says that there are two clear forms of dysentery (a) Amoebic (b) Bacillary. The amoebic form is not so common, only ninety cases being admitted to the Johns Hopkins Hospital in ten years. In these ninety cases, liver abscess occurred in twenty-three. His opinion is that liver abscess is the most distinguishing feature of amoebic dysentery, and that liver/

liver abscess is a very rare sequela of bacillary dysentery, and is almost unknown as a sequel of gaol dysentery in India, which has been proved by Rogers in Calcutta and Predmore in Burmah to be almost entirely due to Shiga's bacillus. This explanation accounts for the statistics of Charles, (20) who in 42,000 cases of gaol dysentery in India found only forty-two cases of liver abscess.

Dardenne Owen & Viatras (21) report a case where amoebae were found in the pus three days after operation, no cocci were present. Monsarrat (22) reports a case of abscess of the liver in a woman who had always lived in Cheshire. The pus was sterile but amoebae were present in large numbers.

Basset Smith (23) reports a case where amoebae were found to the exclusion of other pyogenic organisms. Balfour (24) reports a case where there was no history of dysentery, but in which the amoebae were found in the pus, and post-mortem there were patches of congestion in the large bowel, and these might have been signs of commencing dysentery.

Pilgrim's (25) post-mortem experience has satisfied him that tropical liver abscess invariably means antecedent amoebic dysentery, but the dysentery may be/

may be latent and the patient unaware of it. Greig (26) says it is generally admitted that tropical abscess of the liver is caused by amoebic infection secondary to intestinal infection by the same organism, but the primary lesion of the intestine may be very slight, and give rise to no definite symptoms. Knott (27) observes that amoebic dysentery always precedes liver abscess formation.

Manson (28) sums up the matter by saying, that though the amoeba has not been proved to be the essential cause of liver abscess it probably is. The amoeba lives in the wall of the abscess, in the liver tissue beyond the zone of suppuration and not in the pus. It can usually be found in the pus three or four days after the abscess is opened. He also thinks that the beneficial action of Ipecacuanha in cases of threatened liver abscess is an argument in favour of the amoeba being the cause of the disease. He says that a liver abscess may rupture into the abdominal cavity and not give rise to peritonitis, because the pus is sterile, and in operating on liver abscesses, a certain amount of pus may easily escape into the abdominal cavity and yet it is the exception for peritonitis to occur; whereas if the pus contained pyogenic organisms, a fatal peritonitis would almost/

almost certainly ensue. He agrees with Rogers, that the ordinary organisms of suppuration are only present in a small proportion of tropical liver abscesses, but that amoebae are present in a large proportion, and do not give rise to sepsis. In my own series of cases the amoeba was found in nine, from two to four days after the operation. In one case of old standing abscess it was not found. In one case no microscope was available, and therefore a search was not made. In three cases which burst through the lung it was not found. Manson (29) says, that in such cases, amoebae are not found in the sputum unless the abscess opens directly into a bronchus.

Morbid Anatomy. Though tropical abscess of the liver is also called the large solitary hepatic abscess, this does not preclude the possibility of more than one abscess being present at the same time. Case (1) is a good example of this. At post-mortems, it is not unusual to find two or more abscesses, and these may vary greatly in size and stage of development. Whilst tropical abscess of the liver may occur in any part of that organ, the right lobe is the site in 85 % of the cases. The reasons given for this are, that as the right lobe is so much larger than the left/

left the chances of it being affected are greater, and owing to its proximity to the colon the risk of infection is greater. The majority of abscesses occur towards the posterior and upper surface of the liver, which accounts for the frequent lung complications in such cases.

Probably, the primary lesion in the liver is of the nature of an infarct caused by the blocking of the fine capillaries by amoebae (Rogers). Whether these amoebae, themselves, are capable of breaking down the liver tissue or whether they carry in their substance pyogenic organisms which cause suppuration is as we have seen still a disputed point. Schaudin describes two forms of amoebae, one of which he says is harmless and one harmful. According to this authority the *Entamoeba Histolytica* is a true tissue parasite, and capable of causing dysentery and liver abscess.

Musgrave and Clegg consider that all amoebae in the intestine are pathogenic. Whatever is the correct explanation, the infarct thus formed breaks down, and the process extends, forming an abscess cavity which may be irregular, oval or with branching walls containing chocolate coloured liver pus, which consists of broken down liver tissue, red blood corpuscles, pus/

pus cells, and plasma with haematoidin and cholesterol crystals. Kruse and Pasquall have also found numerous Charcot Leyden crystals in the pus. The cavity may rapidly increase in size till it contains as much as 80 ounces of pus, and the liver resembles a bag of pus, with very little liver tissue left, or the necrotic process may stop whilst the abscess is still small. If the abscess is increasing in size, the wall is soft and spongy and very vascular, which accounts for the troublesome haemorrhage which sometimes occurs after irrigation of the cavity within a day or two of operation. Living amoebae are present in large numbers in the abscess wall, and in the surrounding tissue. They have also been found in large numbers in the branches of the portal vein, which would point to the infection of the liver taking place from the dysenteric bowel through the blood stream. The liver tissue immediately surrounding the abscess is usually infiltrated, and hyperaemic (Scheube). In long standing abscesses, and in strong patients, when the necrotic process ceases, a well marked fibrous leathery wall may be found. This wall limits the spread of the disease and it is possible that if such cases are left untreated the abscess may eventually become encysted, the pus absorbed, and thus a cure may/

may be effected. The liver, in the region of the abscess, may become firmly adherent to the diaphragm and through it to the pleura and lung, abdominal wall, stomach, duodenum, colon, right renal pelvis or pericardium and may ultimately burst in any of these directions. The lung on the affected side may show the pathological appearances of pneumonia and pleurisy, the peritoniteum and the pericardium those due to peritonitis, and pericarditis, whilst careful examination of the colon will reveal, in the great majority of cases, the ulcers peculiar to amoebic dysentery or the scars of these ulcers.

SYMPTOMS AND SIGNS.

The symptoms of acute liver abscess are sufficiently striking to direct attention at once to that organ. The patient who has suffered, or is still suffering from an attack of dysentery, complains that he has been feeling out of sorts for a day or two and that he has a chilly feeling, or even distinct rigors towards evening. He has a feeling of weight or heaviness in the right side, in the region of the liver. In very acute cases, or where the abscess is near the surface, there may be acute pain over the liver and this pain is increased on drawing a deep breath, or on the patient turning over in bed. Very frequently he complains of a constant nagging toochachy pain in the tip of the right shoulder. The symptom is a very common one, and is almost pathognomonic of liver abscess. It is said to be due to the communication between the right phrenic nerve and the branches of the cervical plexus supplying the skin of the shoulder. The phrenic supplies the serous surfaces covering the liver and the parenchyma of the liver itself, and the pain may thus be communicated from one region to the other (Sachs 30.). The patient also tells one that he is restless and sleepless/

sleepless and sweats freely at nights. His tongue is furred and dirty, he has no appetite and may have vomited. He may still be suffering from dysentery in which case the motions will be typical of that disease, or he may be constipated. In either case, the motions should be examined carefully for amoebae. His pulse is rapid and his temperature raised. The fever may be continuous, remittent or intermittent though, usually when suppuration has occurred the temperature chart tends to assume the hectic type, down to 99° or 100° in the morning and up to 101° - 103° at night. On inspection, it is noticed that the patient prefers to lie on his right side or on his back with his legs drawn up. Any movement gives him pain, and the recti muscles are usually tense. The respiratory movements are shallow and the epigastrium and lower ribs on the affected side do not move so freely as those on the other side. This gives rise to a type of breathing, mainly upper costal in character. There may be an appearance of fullness in the right hypochondrium, and the right intercostal spaces may bulge whilst if the case is an advanced one, there may be some oedema over the right lower ribs. Palpation usually gives rise to pain either below/

below the costal margin or in the intercostal spaces, and this pain is increased on deeper pressure. At times the location of the abscess may be discovered by the presence of a specially tender spot.

If the abscess be a large one, and near the surface the liver may feel doughy. Percussion, as a rule, reveals enlargement of the area of liver dullness. This enlargement is said usually to be upwards at first, but in most of my cases downward enlargement was first noticed. The dullness may extend up to the third rib in front, to the fifth rib in the midaxillary line and to the angle of the scapula behind. The upper limit of dullness may be dome shaped, sloping off towards the vertebrae. Below the dullness may extend almost to the umbilicus. Abscess of the left lobe causes an increase of dullness on that side. Frequently when the abscess is on the upper surface of the liver, in close proximity to the lower lobe of the lung, the patient may complain of a troublesome hacking cough which keeps him awake at night and examination of the lung will reveal signs of catarrh, pneumonia or pleural effusion. So well is this recognised, that Manson advises one, always to regard with suspicion a basal pneumonia in a patient from the tropics, especially if he has a history/

history of previous attacks of dysentery.

Radioscopic examination may be resorted to, when if an abscess be present the diaphragm on the right side will be seen to be almost motionless and the costophrenic space will be pressed on. Johnson Smith has found the X Rays useful in determining the mobility and position of the diaphragm

Examination of the urine may show increased NH_3 and diminished urea, relatively and absolutely. The patient may be given two drachms of laevulose at night, and the urine, when examined next morning may give the reaction of sugar because alimentary glycosuria is said to be easily produced in liver abscess.

Harris and McReady (31) relate a case in which the presence of leucin tyrosin and cholesterin in the urine suggesting some active process in the liver helped in the diagnosis of liver abscess. A blood count may reveal leucocytosis, and Pilgrim observes that this stage is of great value in determining the supervention of suppuration and for that reason one should be made every two or three days. Melland and Simpson report cases, where the presence of leucocytosis helped them to diagnose liver abscess.

It/

It is possible, however, than an abscess may be present without causing leucocytosis and Greig says that he has found a very high leucocytosis in cases of severe bowel lesion without any liver complication. Therefore one should not place too much reliance on this sign. Rogers(32) reports that leucocytosis in amoebic abscess is peculiar, in that the proportion of polymorphonuclears is little if at all increased, as it is in other forms of suppuration. A similar type of leucocytosis is present in the more acute cases of presuppurative amoebic hepatitis and he regards this and the fact that such cases rapidly yield to full doses of Ipecacuanha as further links in the chain, connecting amoebic dysentery with tropical abscess of the liver. In thirteen of his cases only three had over 80 % of polymorphonuclears, and he gives the following interesting table of his blood counts.

Acute Hepatitis without abscess.

R. B. C.	W. B. C.	Ratio of white to red	Poly-nuclears	Lymphocytes	Large Mono-nuclears.
5,390,000	11500	1-468	73	23	4
-----	10250	---	75	20	5
3,780,000	7875	1-480	78	17	3
5,020,000	9500	1-528	79	14	4

Acute Hepatitis without abscess. contd.

R. B. C.	W. B. C.	Ratio of white to Red	Poly-nuclears	Lymphocytes	Large Mono-nuclears
4,220,000	3750	1-1125	62	15	23
Liver Abscess.					
2,670,000	13250	1-201	98	20	12
4,030,000	12750	1-316	86	10	4
4,750,000	14500	1-327	89	9	2
2,860,000	8625	1-332			
3,485,000	38300	1-89	76	14	10
5,740,000	12750	1-450	88	9	2
3,440,000	20750	1-253	87	8	5

to
Average ratio of white, red blood corpuscles in

Hepatitis = 1-448

Average ratio of white to red blood corpuscles

Abscess = 1-327.

He found that leucocytosis was most marked in deep seated abscess and in a second paper he concludes that (1) absolute leucocytosis is nearly always found in amoebic abscess of the liver, but in chronic cases with marked anaemia only a relative leucocytosis may be found; (2) the degree of leucocytosis is very variable, being highest in the most acute cases, while/

while a low degree is commonly met with in cases with an insidious onset, in which repeated examinations may be necessary. The symptoms persist, as a rule tending to increase in severity, till the abscess is opened or bursts either externally, or into another organ. If the abscess is pointing towards the lung, the cough will become more troublesome and the sputum increase in amount, the area of dullness at the base of the lung will extend and the bronchial breathing, crepitations, or rales become more marked, till finally rupture does take place, and the patient may be suffocated by a tremendous gush of pus, or it may escape gradually and ^{be} coughed up. When this occurs the patient may recover after a long and tedious illness or may gradually sink from exhaustion. The impending rupture of a liver abscess into the stomach, may be indicated by persistent vomiting, and when rupture actually takes place by the ejection of quantities of typical liver pus. Rupture into any part of the intestine, usually gives rise to no promentory symptoms and the first evidence of such an occurrence is the presence of liver pus in the stool as in Case VIII. Rupture into the peritoneal cavity may be accompanied by few symptoms if the pus be sterile but if it contains the organisms of suppuration/

suppuration then the usual signs and symptoms of acute peritonitis will rapidly supervene. If rupture does not occur, or if having occurred, the drainage thus afforded be not sufficient or if the abscess be not reached by operation and drained the patient will continue with a hectic temperature gradually losing strength till finally he dies of exhaustion - vide Cases I. II. V. and X.

The symptoms and signs of acute liver abscess are thus seen to be fairly easily recognisable. It is far otherwise with those of chronic longstanding abscess. In such cases, there is frequently little or nothing to draw one's attention to the liver. The patient is pale, thin and wasted. He may have a cachetic appearance like a man suffering from cancer. Jaundice is rarely seen, but the skin assumes an unhealthy pale yellowish complexion called by Dutroulan "paleur ictérique". There may be some oedema of the feet and venous enlargement of the superficial abdominal and intercostal vessels. His temper is irritable. There is usually a history of remote attacks of dysentery and often alcoholism. He complains of progressive deterioration in health and of indigestion, anorexia, flatulent dyspepsia and usually/

usually is constipated though rarely he may suffer from diarrhoea. He may complain of a troublesome cough and nightsweats, and this with his wasted appearance at once makes one think of phthisis. On examination his pulse is found to be weak, and the temperature may be normal, or even subnormal or there may be regular or irregular rises. The liver dullness may be enlarged very slightly, if at all or it may be greatly enlarged, and one may even get deep seated fluctuation. As a rule there is not much pain on pressure over the liver, though a certain tenderness may be complained of. On auscultation at the base of the lung, one frequently gets evidence (crepitations and modified bronchial breathing) of a chronic pneumonic process or of pleuritic exudation there; it is in such case as these that a blood count is of great value. If the condition be not recognised and operated on, the patient will gradually sink and die sometimes from pneumonia, but generally from gradual wasting and asthenia.

DIAGNOSIS.

In tropical countries malaria is so very prevalent, that when a patient complains of a feverish feeling coming on daily, possibly preceded by a chilly feeling or/

or even slight rigor, and when he is somewhat anaemic and thin, and especially if there is any enlargement of the spleen, one instinctively thinks of malaria. If his spleen be enlarged and if the rigors and fever disappear after administration of quinine, one may be satisfied that one's diagnosis of malaria is correct, but if in spite of ample doses of quinine his fever still continues and the area of liver dullness is increased even very slightly then one's attention should be concentrated at once on that organ.

Manson says that most cases of abscess of the liver used to be saturated with quinine before a definite diagnosis was made. Nowadays this mistake can be avoided by making an examination or if necessary repeated examinations of the blood. If the malarial parasite be found all doubts are set at rest, or even if on account of the previous administration of quinine the parasite cannot be detected, leucopenia, with increase of the large mononuclear leucocytes would point to malaria, whilst the characteristic leucocytosis described by Rogers would indicate liver abscess. Certainly the count was of the greatest assistance in the diagnosis of one of my cases - (Case IX).

Simple/

Simple hepatitis consequent upon chill or over indulgence in alcohol may confuse one for a day or two, but the symptoms rapidly disappear after a dose of calomel followed by salines. In this case also, a blood examination might help by showing the absence of leucocytosis.

Acute pneumonia may closely simulate acute liver abscess, and in many cases the proximity of the inflammatory process in the liver to the base of the lung may give rise to symptoms resembling those of acute pneumonia, so that in a tropical patient with symptoms of pneumonia, one should always be suspicious of liver abscess.

The diagnosis between these two conditions may be made by carefully watching the area of dullness at the base of the lung, and by the altered breath sounds over the affected part of the lung. The percussion note over the area of consolidated lung tissue is not so very dull as over a corresponding portion of inflamed liver tissue, and if the lung be not affected the normal breath sounds can be heard over the area of dullness. In the cases of liver abscess which I have seen and in which the lower lobe of the lung was affected, the breath sounds were not so very typically bronchial, as in acute pneumonia, and/

and the bronchial type stopped abruptly at the upper limit of dullness and did not gradually shade off,, whilst the crepitations were not so fine as in lobar pneumonia.

In all cases a history of a preceding or accompanying attack of dysentery will help, and an examination of the sputum will, if the case be one of acute lobar pneumonia show the presence of pneumococci. The chronic longstanding abscess may also set up a condition at the base of the lung which at first sight may suggest a chronic pneumonic tubercular focus there, but here again, the history of dysentery will help and an examination of the sputum will fail to show any tubercle bacilli.

In all cases of doubt an exploration of the liver with trocar and canula attached to an aspirator should be made. The risk of the small operation if done with strictly aseptic precautions is practically nil. Some cases of fatal haemorrhage following puncture of the liver have been recorded, but if Cantlie's directions are carefully followed such an unfortunate result is impossible. The patient must be anaesthetised, and the canula must be large enough to allow thick pus to flow freely through it. Manson says that one should not rest satisfied that there/

there is no pus in the liver till one has made at least six punctures, but if necessary, I should in the case of a robust young individual make up to ten or twelve attempts.

Pleuritic effusion may be mistaken for liver abscess, but the area of percussion dullness should help one here, as in liver abscess the upper limit of dullness is convex and fallsoff towards the spine whilst in pleuritic effusion this does not occur.. An exploration of the chest with a grooved needle and syringe or aspirator is a much more satisfactory way of clearing up the diagnosis where there is any difficulty.

Suprahepatic and subphrenic abscesses may closely resemble liver abscess and be almost impossible to diagnose from it. The previous history of dysentery will help in the case of liver abscess and in any case the treatment is the same viz :- to evacuate the pus as quickly as possible. Hydatid cysts may resemble liver abscess, but exploration and examination of the fluid discharged will reveal the presence of hooklets and thus put one on the right track. In the Straits, hydatid disease is very rare indeed, and the dysentery /

dysentery is extremely common and this fact would help in the diagnosis in that part of the world.

Suppuration in the gall-bladder might give rise to symptoms resembling those of liver abscess, but the position of the swelling and its shape should be sufficient to prevent any mistake being made, whilst a history of gall stones would aid one materially.

Old standing abscess of the liver may closely resemble and may even be mistaken for cancer of the liver, (Case II) as the abscess may run an afebrile course or may cause only very slight pyrexia, whilst cancer may cause a rise of temperature. The age of the patient, since liver abscess is commonest between the ages of 20 and 45, should help and an exploration would clear up the matter at once.

Syphilitic gumma of the liver may possibly cause some confusion but a careful enquiry into the patient's history and the effect of full doses of Potassium Iodide will settle the diagnosis.

Charles reports five cases of suppuration in the rectus muscle, in three of which there was some difficulty in diagnosing them from possible liver abscess. The insertion of an aspirator needle into the suspected swelling will solve the difficulty. If the needle is in the liver, the outer end will move/

move like a pendulum as the patient breathes, except in the unusual case of the liver being very firmly bound by adhesions to the abdominal wall. If the needle be in the rectus muscle or sheath it does not move with respiration.

To sum up, the chief points in the diagnosis of tropical liver abscesses are enlargement of the liver accompanied by more or less pain in that organ and in the right shoulder, more or less fever, a previous history of dysentery, a marked increase in the leucocyte count and the discovery of pus on exploration of the liver, and the presence of amoebae in that pus.

PROGNOSIS.

The prognosis in all cases of liver abscess should be most guarded. If the abscess be a solitary one, and the patient young and strong, one may hope for a rapid recovery; but it must always be remembered that there may be several abscesses, and though one is reached and drained the others may not be reached even after several attempts and may exhaust the patient's strength (Case I.). The position of the abscess and its depth from the skin surface affect the prognosis. If it be pointing between the ribs, or on the abdominal skin surface, or if it be/

be reached at the first needle puncture close to the ribs or under the costal margin, then the prognosis is good; but if it be reached only after several punctures and at a considerable depth the risk is greater, for the deeper the abscess is, the greater the difficulty in obtaining satisfactory drainage. It is almost needless to say, that the more quickly the abscess is found and drained the better for the patient.

Delay in operating after the abscess is located is dangerous, and it is always better to have the patient's consent to operate at once if pus is found. The general condition of the patient must be taken into consideration e.g. a man who has been pulled down by long continued dysentery or who has suffered frequently from malaria stands less chance of recovery than the recent arrival in the colony, who has been in good health except for a preliminary attack of dysentery up to the time the abscess develops. Alcoholic subjects do badly, and there is a risk of delirium tremens setting in after the operation. We have learned by experience in the Straits that when the discharge is markedly bile stained, the prognosis is always more grave than in cases in which the pus is not thus stained. Possibly the presence of much bile indicates a more rapidly necrotic process in the liver/

liver, and the absence of any definite line of demarcation between the abscess cavity and the rest of the liver tissue. Spontaneous rupture of the abscess should not be allowed to occur, as even in the most favourable case, where the abscess bursts through the lung, it takes longer to heal than if it had been efficiently drained from outside, and the patient's strength may not be sufficient to stand the strain of the long illness, or if the abscess be a large one he may be suffocated by its contents at the time of rupture. Perforation into the colon may have a favourable termination, but if it occurs into the duodenum or stomach the chances of the patient's recovery are more remote, whilst rupture into the pericardium, or general abdominal cavity setting up general peritonitis is extremely unfavourable, though if the condition were recognised promptly, and rapid operation performed by a competent surgeon, there might be a slight hope of recovery.

In my series, 15 cases - for one of the cases had not developed an abscess though the liver was markedly enlarged and congested - there were seven deaths, a percentage of 46.6, but, if we except Case VII. who died of haemorrhage from a dysenteric ulcer, and in/

in whom the abscess cavity was healing, and Case V. where the parents of the boy refused to allow any adequate operation, the mortality falls to 33.3 %. This compares favourably with the mortality 80 % which Roms (34) observed in Algiers, and 72.5 % in 128 cases in Egypt reported by De Castro (35). In the East Indies, the mortality according to Morehead, (36) varied from 14 to 34 %. Fayrer (37) reports mortalities of 48 % and 6.7 % amongst English soldiers in various foreign stations, but this included all cases of hepatitis and did not refer to liver abscess only.

De Castro (38) reports a mortality of 76 % in cases which were not operated on, and 48 % in the cases operated on. The Societe medico chirurgicale of Alexandria reports a mortality of 80 % amongst the cases which were not operated on, and of 42 % in the cases where operation was undertaken; thus indicating the necessity for operation, the earlier the better.

Charles (39) reports a mortality amongst his cases of 37.8 % in natives treated in hospital, and of 20% in Europeans and good class natives.

The causes of death in my cases were exhaustion - five cases, suffocation from bursting of the abscess into the lung - one case, haemorrhage from a burst dysenteric/

dysenteric ulcer, one case. One case, which burst through the duodenum, died after an operation performed in the hope of more efficiently draining the abscess cavity. Two cases which burst through the lung recovered without operation.

TREATMENT.

The treatment of liver abscess divides itself into two heads, (1) Abortive or preventive, (2) operative.

(1) ABORTIVE TREATMENT. I have found that the most efficacious treatment, when called in to see a patient with all the symptoms of acute hepatitis, pointing to the possibility of an abscess forming, is to purge him freely with calomel, 5 grains followed by a strong saline purgative. Formerly, in the Straits Government Hospitals, enormous doses - up to a small teaspoonful of Calomel were given, but one gets the same effect with the smaller dose and probably does not run such a risk of causing stomatitis. Smaller doses than 5 grains are, in my opinion, useless. The free application of leeches over the liver is most efficacious in relieving the pain of which the patient complains, and may by reducing the congestion of the liver help to abort abscess formation. I am inclined to think that the use of leeches in this disease has been somewhat neglected, and I know of no disease in which they give such satisfactory results. If the pain is very severe and the patient restless, a small hypodermic injection of morphia may be given, but this should be avoided if possible./

possible. Cupping over the liver may be tried, as also the free application of mustard plasters. When the process of congestion is further advanced and it seems that suppuration has occurred, hot fomentations with glycerine and belladonna may be employed.

My experience is, that by far the most satisfactory method of relieving the hepatitis is by freely puncturing the liver with an aspirator needle. This often has a wonderful effect in aborting abscess formation and in reducing the enlargement of the liver vide (case H.W.). From six to twelve punctures may be made, and provided strict aseptic precautions are taken and the needle is not introduced too far, the risk is practically nil. Cantlie found that in a body with a circumference of 32 inches at the level of the liver, the centre of the Inferior Vena Cava is $4\frac{1}{2}$ inches distant from the skin surface, so that if one does not insert the needle so far as this there is no risk of wounding this important vessel. Manson recommends that before the liver is explored a blood count should always be made because he thinks that some cases of death from haemorrhage after exploration may have been due to leucocythemia and such a condition would have been detected at once by a blood count./

count. Charles (40) advises the administration of calcium chloride both before and after exploration to prevent haemorrhage. Rogers (41) strongly recommends full doses of Ipecacuanha in cases of hepatitis before suppuration has occurred, and reports (42) that in such cases the drug is most useful in reducing the fever and the congestion of the liver, and in preventing abscess formation, whilst, in many cases of long continued fever where hepatitis is unsuspected but leucocytosis is present, if full doses of Ipecacuanha be given the fever disappears. He therefore urges that the remedy should be tried in all cases before operation is decided on. Murray and Harris in Calcutta confirm Rogers' statement and report remarkable results from the use of Ipecacuanha. The mode in which the drug is administered is of importance; the patient should not eat or drink anything for two hours before and after the dose, but twenty minutes previously he should take 20 grains of chloral; the dose of Ipecacuanha is 30 grains for the first three or four nights, reduced to 25 and 20 grains gradually, a single dose daily being usually sufficient. If given in keratin capsules the patient suffers only for a short time/

time from nausea, and if he lies absolutely still he usually drops to sleep under the influence of the chloral. When the leucocytosis has fallen to 10,000 or less, the temperature has become normal, and the discomfort in the region of the liver has disappeared, the drug may be continued for another week in daily doses of 20 grains, and then the patient be allowed to get up, and a few days later, he may be sent away for a change of air; but all patients who have had such an attack should abstain from alcohol so long as they reside in India. Ipecacuanha should be tried, except where there is evident bulging of the intercostal spaces or pointing of the abscess, and, if administered as described, it is capable of curing hepatitis and preventing the formation of abscess. In support of this opinion Pilgrim (43) appeals to his hospital experience in Calcutta where for the last four years more than 200 cases of dysentery and about 82 cases of hepatitis have been treated annually; during the last three years Ipecacuanha had been systematically employed, and not a single case of dysentery has been complicated by hepatitis, while every case of hepatitis has recovered without suppurating; his average number of operations for liver abscess/

abscess has fallen from ten to twelve to three or four in the year, and for the last eight months he had only had one case. His personal experience is confirmed by that of Firth and Rogers, and he gives a table of the admission-rate and death-rate per 1,000 and case mortality for liver abscess amongst British troops in India, which shows that, whereas up to 1907 the figures remained at much the same level for the past fifteen years, since that time there has been a marked reduction, which he does not think can be entirely attributed to the decreased consumption of alcohol, but is the result of the revived and systematic use of Ipecacuanha in the treatment of hepatitis and dysentery during the last two years. Calvert (44) relies upon Ipecacuanha and says he believes it is the only drug of any value in the hepatitis which so frequently accompanied dysentery. The effect of administering full doses of Ipecacuanha in early cases of amoebic hepatitis is to produce a fall in the temperature and leucocytosis with disappearance of the subjective symptoms, and he quotes cases to illustrate this statement. He has used Ipecacuanha practically in every case of hepatitis, and has become absolutely convinced of its value. During the last year he has used Ipecacuanha in the treatment/

treatment of liver abscess after aspirating and injecting quinine solution into the cavity without draining it on the plan suggested by Rogers, and is assured of its utility. He claims the fall of the death-rate from hepatic abscess in the British army in India, amounting to 60% in the last three years, as due to the re-introduction of the Ipecacuanha treatment. I have tried it in one case only (VII) but here in spite of a preliminary dose of Tr. Opii the patient vomited the Ipecacuanha within half an hour and refused to take more and later the abscess had to be opened.

(2) OPERATIVE TREATMENT. It is recognised that the prognosis of liver abscess depends to a certain extent upon the rapidity with which the abscess cavity is reached and drained, therefore as soon as one finds that the congestion is not yielding to the methods mentioned above, one should thoroughly explore the liver with an aspirator needle, for even if no pus is found, we have seen that the hepatitis may be greatly relieved in this way. The patient's skin must be washed with soap, ether or turpentine and a corrosive sublimate lotion poultice applied. Then the skin should be painted with equal parts of tincture and liniment/

liniment of iodine. This makes the skin as aseptic as it is possible to do. The patient must be anaesthetised, as it is impossible to make a satisfactory exploration of the liver otherwise. I have used chloroform administered by the open method in all my cases and have found it most satisfactory. A needle of sufficient calibre to allow thick pus to flow through it must be used, and it is well to see that the aspirator is working properly before making any of the punctures. If pus be not found at the first attempt, withdraw the needle and put it in again at a different point. One should aspirate at different depths at each puncture, as it is possible to push the needle right through a small abscess and not find the pus. One can usually tell when the needle has entered the abscess cavity, because the point of the needle feels more mobile and one loses the sense of resistance to its passage. It has been recommended to insert the needle in different directions through the same puncture, but my experience of this method is not at all satisfactory, and I am convinced that it is much better to make each separate insertion at a different point. One should not rest satisfied that there is no pus in the/

the liver till one has thoroughly explored the organ in all directions by, if necessary, twelve punctures. If pus be found proceed to drain the abscess cavity at once. Various methods of doing this have been recommended, but in my opinion the only satisfactory one for the man who is not a thoroughly expert surgeon, is the one I now describe. Having found the pus, detach the aspirator from the needle which is left in situ. Plug the end of the needle with a pledget of wool to prevent the further escape of pus. Then make an incision about four inches long alongside the needle, which should be in the middle of the incision. Divide the skin and fascia, and if the puncture be between the ribs, the intercostal muscle, or if below the costal margin, the tendons of the muscles of the abdominal wall. Then slip a pair of dressing forceps along the needle into the abscess cavity and enlarge the opening by separating the shanks of the forceps till finger can be introduced into the cavity. Then feel where the lower part of the cavity is, and proceed to excise a portion, about $1\frac{1}{2}$ - 2 inches of the rib, the removal of which will afford the most complete drainage. If the incision is below the ribs, the opening is enlarged till the largest size of drainage tube can be easily/

easily passed into the abscess cavity. This small operation is very simple and most satisfactory. One must be careful to peel off the periosteum from the rib, and not injure the intercostal artery. With these precautions, no serious results should follow. There may be pretty smart haemorrhage from the liver tissue, but this can always be controlled by packing firmly with gauze. Theoretically, there may be a risk of leakage from the abscess into the pleural or peritoneal cavity, but I have never seen such an accident happen, for, by the time the operation is done firm adhesions have as a rule been formed between the liver and the walls of the chest or abdomen, and, in any case, seeing the pus in a liver abscess is so frequently sterile, the risk of infection of these cavities set up is small. If, at the time of operation one thought such a thing likely to occur, one would take the precaution of packing round the drainage tube with gauze. The same remarks apply to the risks of causing pueumothorax by such an operation. I have never seen or heard of a case where this occurred. Some authorities give elaborate directions for stitching the two pleural surfaces together, or the liver substance to the abdominal wall but I think this is unnecessary/,

unnecessary, increases the risk of the operation and certainly would be extremely difficult to do, for the different layers are not easy to recognise and I doubt if the inflamed liver tissue would hold any stitches. Hooton (45) says that it is impossible to suture the liver to the abdominal wall because the tissue of the liver is so friable. As I have said before, packing round the edge of the wound with gauze is all that is needed. The essential thing is to secure perfectly free drainage, therefore, make the opening large enough to admit without any difficulty the largest drainage tube, which should be stitched to the skin to prevent it slipping back into the abscess cavity. If free drainage does not occur, the original opening may have to be enlarged or counter openings made as in cases IV and XIII. The wound should be dressed with gauze and plenty of wool, and a careful watch kept for the discharge soaking through or escaping by the side of the dressing as it is essential to prevent a mixed infection occurring, for if this should happen it will certainly delay the healing process, and increase the risk to the patient. The dressings should be changed at least twice a day, and as the discharge lessens in quantity and/

and the abscess cavity contracts the drainage tube may be gradually shortened, or replaced by one of smaller calibre, till finally the discharge is so little that one is no longer required. In a favourable case the healing process may be complete in three weeks, but in other cases it may run on for three months or more. In my experience, washing out the abscess cavity, either at the time of operation or for five or six days afterwards, is neither necessary nor advisable, but if at the end of that time, the discharge is not lessening in quantity or the patient's temperature still rises a little at night, then, the abscess may be washed out carefully with Boracic Acid lotion, corrosive sublimate lotion (1.5000), potassium permanganate lotion (1.4000), Chinosol lotion, a solution of quinine (5 grs. to loz.), as recommended by Rogers, or a very weak carbolic acid lotion. I have found the Boracic Acid (case IV), and corrosive sublimate lotions (case XIII) the most satisfactory and have been disappointed with the results from the Quinine Solution. In cases which tend to become chronic and show no signs of contracting and healing up I have found a lotion containing Tr. Iodi 3i to Oi of boiled water most satisfactory in/

in stimulating the healing process (Case XIV), Manson (46) Cantlie, (47) and McLeod (48) regard the operation I have just described as being unnecessarily severe and strongly advise the use of a special trocar and cannula with which it is possible to insert a drainage tube into the abscess cavity without any open operation. Manson has devised such an instrument as has also Brown (49).

Cantlie (50) reports 28 cases treated in this way with 24 recoveries. I have tried this method in one case only, (X) and it certainly did not afford adequate drainage, and I should not be inclined to use it again unless the patient were too ill to stand the more extensive operation, or the abscess so deep seated as to make one dread severe haemorrhage, and one had no skilled assistance.

Rogers (51) in view of the effect of quinine in killing the amoeba recommends a method of aspiration of the contents of the abscess cavity and injection of quinine solution repeated as often as necessary. He invented a special tube for this purpose and advises a solution of 3 - 5 grs. Quinin Bihydroch to an ounce of water but says that not more than 30 grs. of quinine should/

should be injected altogether. He argues that Manson's trocar admits air to the abscess cavity, and, thus, there is a risk of infection from outside with pyogenic organisms. His method prevents anything of this sort occurring. He also advised that during the treatment Ipecacuanha in 5 grain doses should be administered to prevent the formation of other abscesses. He (52) reports a case successfully treated by this method as also do Spencer (53) Rogers and Wilson (54). If the result is not satisfactory, then the open operation may be done. Hooton recommends aspiration and quinine injection and suggests that in all cases a drop of pus should first be examined. If this proves to be sterile, then the aspiration method may be given a trial, but if staphylococci are present, then the open operation should be preceded with. I have no experience of this method and have not found quinine solution specially helpful in healing up an abscess cavity after operation. Some enthusiastic Surgeons recommend laparotomy and visual examination of the liver. This may be possible in the case of expert abdominal Surgeons with good assistants, and every appliance of a modern hospital at command, but is in the great majority of cases quite unjustifiable in the tropics./

tropics.

What is to be done if the abscess has already burst into some other organ? McLeod (55) recommends that if the abscess bursts into the lung no operation should be done because repair has set in and it may be impossible to find the primary abscess.

In my series of cases, three burst into the lung. One was suffocated by the pus and died at once, the other two recovered after a prolonged illness. In a future case I should be guided largely by the symptoms. If the patient's temperature kept down and he was not losing ground, I should be content not to interfere, but if the temperature still kept up after the rupture, the expectoration of pus was scanty, and the patient losing ground then I should strongly urge operation. The same remarks apply to the treatment of abscesses which burst into the stomach or bowel; if the patient's progress is satisfactory leave him alone, if not operate. We have seen that the pus is probably sterile, but if rupture occurs into the peritoneal cavity, it would be well to drain the abdomen as speedily as possible.

Rupture into the pericardium, fortunately an uncommon accident, occurring as shown by Rendu (56) in only/

only 0.13% of the cases of liver abscess which burst spontaneously, is necessarily rapidly fatal, but a desperate effort to save the patient's life might be made by draining the pericardium. An abscess about to burst through the skin should never be allowed to do so, but should be incised and drained under the strictest aseptic precautions to prevent mixed infection.

Prophylaxis. Anything likely to cause congestion of the liver must be avoided, therefore excess of all kinds should be guarded against. The vast majority of young Europeans who come to the tropics are picked men, who have been carefully examined by competent physicians at home to determine whether they are fit for work in the tropics. For such youths, the use of alcohol is absolutely unnecessary and possibly harmful, and one cannot insist too strongly on this point. The European's diet should not be so largely a proteid one and he would do well to follow the example of the native in partaking of less meat and eating instead more farinaceous food, fruit and vegetables. A certain amount of exercise is necessary in most people for the maintenance of good health in the tropics, but this must not be carried to excess, and games indulged in till one is thoroughly tired out and exhausted. Exposure to the sun should be avoided as much as possible, and/

and chills should be carefully guarded against, by wearing a cholera belt and by changing all one's clothes as soon as possible after perspiring. An inordinate indulgence in the temporarily refreshing cold bath may give rise to congestion of the liver, so, it is well to limit one's cold baths to two a day, and even in some susceptible people to use only tepid baths. The further prophylaxis of liver abscess is that of amoebic dysentery, therefore one should boil all one's drinking water and milk, and never eat any green vegetables which have not been thoroughly cooked. Any case of amoebic dysentery should be promptly and fully treated with Ipecacuanha and even after the patient is quite cured he should abstain from all alcoholic drinks as long as he remains in the tropics. All dysenteric stools must be carefully disinfected and then buried in order to prevent contamination of articles of food by flies. The whole prophylaxis of tropical abscess of the liver may be summed up in the old precepts to live a sober and righteous life, to wear flannel next the skin, and to attend carefully to the daily action of the bowels. If these instructions were carefully followed I am sure there would be many fewer cases for us to deal with.

CASE I.

J. Van I, a Dutchman, aged 23, a bank clerk, was first seen on May 4th, 1900. He had arrived in the colony in January of the same year, and had been quite well, with the exception of a slight attack of diarrhoea lasting two days, a fortnight earlier. He said that his motions had been loose, but he had not noticed any blood or mucus in them. The diarrhoea was apparently cured by a dose of castor oil followed by an astringent mixture. Before his arrival in Penang he has been in the habit of drinking lager beer with his meals, but had always been moderate in its use. Since arriving in the colony he had drunk whisky and soda, on an average about four ounces of whisky daily, and usually an ounce of gin before dinner. On May 3rd, which was a holiday, he went for a long walk over the hills. He must have walked at least ten miles and of course perspired profusely. On arrival at the hill hotel, he sat down clad only in a white duck suit soaking with perspiration, and rested till he began to feel chilly, had a drink and then walked to the foot of the hill, another three miles. On reaching home, he had a cold bath and some dinner and went to bed feeling very tired. The/

The next morning he awoke feeling stiff and tired, but got up had another cold bath and went to office. He came to see me about 2 p.m. saying, that he felt feverish, that his bones and head ached and that he had not been able to eat any lunch. His temperature and pulse rate were raised. I gave him a dose of calomel and some diaphoretic mixture, and ordered him **home** to bed. Next morning I saw him early, when his temperature and pulse rate were still raised, his tongue furred, and he complained of pain in his right side and tenderness on pressure under the costal margin. The breath sounds over both lungs were clear, and without friction or other accompaniments, and there was no increase of liver dullness. The diaphoretic mixture was continued and hot fomentations ordered to be applied over the liver. The same night he was no better, and the following morning as his temperature was still raised and the pain in his side had prevented him from sleeping, whilst no suitable arrangements could be made to nurse him in the bachelor mess in which he lived, I took him to hospital. There ten leeches were applied over his liver, and he was freely purged. This relieved the pain in his side, but the temperature still kept up and began to assume a hectic/

hectic type, whilst the liver dullness was increased about an inch upwards. Accordingly his liver was explored on May 13th with a trocar and canula. Pus was found at the second attempt in the mid axillary line. Keeping the canula in situ, an incision was made in the skin, a piece of rib resected and a pair of dressing forceps pushed in alongside the canula. The opening was enlarged and a finger introduced into a ragged abscess cavity. A large drainage tube was inserted and the wound dressed. After the operation his temperature dropped, but not to normal, and it remained of the hectic type down in the morning and up in the evening. Amoebae were found in the pus on the third day after the operation. The discharge from the abscess became bile stained - a sign which the medical men in the Straits regard with apprehension, for as a rule, these cases in which the discharge is bile stained do not do well. After three days a counter opening was made in the intercostal space below the site of the original incision. A second drainage tube was inserted through this opening, and the abscess cavity washed out twice daily, at first with Boracic lotion and later with an Iodine lotion. This having no effect in lowering the temperature, and as the patient was manifestly losing ground, /

ground, the liver was again explored in six different places on May 20th. No other abscess was found. In spite of all treatment he gradually went down hill and died on May 29th.

A Post-Mortem was performed three hours after death. The abscess cavity which had been opened was^{found} to be clean and had contracted considerably from its original size as felt by the finger at the time of operation. On the upper surface of the right lobe of the liver a second abscess was found. This one was of small size, but evidently was the cause of his continued fever and the ultimate cause of his death. In the ascending colon two small recently healed dysenteric ulcers were found.

This case illustrates the rapidity with which liver abscess may develop after over-exertion and a chill in a patient who has had only the slightest symptoms of dysentery. The continued fever, in spite of the free drainage afforded by the counter opening into the first abscess cavity, led one to suspect strongly the presence of a second abscess which, unfortunately, was not reached by the trocar and canula in the second exploration of the liver. In another such case one would not rest satisfied/

satisfied with six punctures, but if the patient were in a fit condition, would introduce the trocar and canula certainly a dozen times, before one gave up the search.

CASE II.

E. T. aged 63, a French planter, who had been in the country for many years without a change to a cold climate and who besides marrying a native women had adopted a native diet, was first seen in October, 1901. He had suffered from time to time from malaria, and on several occasions from dysentery, but had always treated himself with quinine and native drugs. He had lived an abstemious life, never consuming more than one glass of whisky a day. For the last three or four months he had been getting weaker and less fit for his work. He complained of no definite pain, just a general feeling of lassitude, weakness and loss of appetite. He was thin, very pale and his skin had an earthy tinge, but he was not jaundiced and there was no bile in his urine. On examination I found his liver extended $2\frac{1}{2}$ inches below the costal margin. There was little or no pain on pressure, and the organ felt hard and nodular on the surface. His other organs were healthy. I had him under/

under observation for a week and at no time did his temperature rise above 99'. On consultation with two other medical men, we came to the conclusion that the patient was suffering from cancer of the liver and that there was no indication, nor in his very weak state any justification for any operative interference. He was kept in bed on milk diet, and gradually became weaker and died three weeks after he had first been seen. Post-mortem

Post-mortem, a large abscess containing thick pus was found in the right lobe of the liver. The abscess was evidently an old standing one and becoming encysted. The walls of the abscess cavity were thick and resistant and the surface of the liver was roughened and nodular. The colon showed signs of old healed dysenteric ulcers. No amoebae could be found either in the pus or in the abscess wall. Possibly a blood count would have helped in the diagnosis, as Rogers says that in old standing abscesses one finds not an absolute leucocytosis but only a relative one, i.e. the leucocytes are increased in proportion to the red blood corpuscles. His age, pallor, loss of flesh and the feel of his liver misled us all, so that the possibility of abscess of the liver was not seriously considered. Had he been a younger man/

man or had there been any marked rise of temperature, though this may also occur in malignant disease, we should have advised exploration and must have found the pus at once, but he was certainly not in a fit state to stand anything in the nature of an operation. Fayrer states that "the value of the thermometer here, i.e. in liver abscess, is great but cases do occasionally occur in which no rise of temperature has been observed; it is perhaps, however, the most reliable indication we have of the change going on in the liver, the absence of other symptoms making diagnosis so obscure."

Case III.

B. E. M. an Englishman, aged 36, had been in the service of a Native State as commissioner of police for ten years. During that time he had suffered from malaria several times and from dysentery twice, the last time being about three months before his present illness. The dysentery had not been very severe and had been cured in a fortnight by astringents and a milk diet, though he said he had not felt quite comfortable in his stomach since the dysentery. He had always indulged in alcohol freely, and his work entailed a good deal of physical exertion and exposure to the sun. On May 18th, 1902, he took part in a cricket match which was played/

played in a broiling sun. He returned to the club house when the match was over, sweating profusely and sat for an hour drinking and talking without putting a sweater on. Then he began to feel chilly and went home to bed where he had a rigor. I saw him the following morning when he had a temperature of 102', a rapid pulse and complained of severe pain in the right side over his liver. The pain was increased on movement and on taking a deep breath. He also said he had coughed a good deal during the night and thought he had caught a severe cold. There was no definite physical signs and he was ordered Calomel, a diaphoretic mixture, and hot fomentations with glycerine and belladonna over the liver. This treatment relieved the pain, but the temperature still kept up, and on later examination some crepitations were heard at the base of the right lung, where percussion gave a dull note continuous with the liver dullness. The diagnosis lay between a commencing acute pneumonia, and hepatitis settling up a secondary pneumonic consolidation at the base of the right lung. The physical signs were carefully watched and remained practically the same. There was no extension of the dullness and the crepitations were still present. The temperature varied slightly from 101' in the morning to 102.5' in the evening, /

evening, and on the sixth day from the onset of his illness, it was decided to explore the liver next day. All preparations were made but on arrival at the house in the morning we were shown some peculiar sputum which he had coughed up during the night. On examination this proved to be typical liver pus. Evidently the abscess had burst through the lung. The condition of affairs was explained to the patient and as the amount of pus escaping by the lung was small, he was advised to have the liver explored and an opening made to allow of the free drainage of the cavity. He however preferred to wait and see what would happen. During that day more pus was coughed up, and as his temperature began to come down a little, he decided to have nothing further done. He dragged on, daily expectorating a considerable quantity of pus, till at the end of six weeks the discharge ceased, his temperature remained normal and he began to put on flesh. A sea trip completed the cure and he is now as well as he ever was.

This case illustrates the facts that liver abscess may come on some months after the dysentery is apparently cured, that the habitual consumption of large quantities of alcohol predisposes to the disease and that a chill may/

may be the exciting cause. The abscess must have been close to the upper surface of the right lobe of the liver, have caused consolidation at the base of the right lung and burrowed its way quickly through the diaphragm and consolidated lung to burst into a bronchiole. If the discharge through the lung be free, and, as a result, the temperature falls, then the abscess may be allowed to empty itself through the lung, but this is usually a slow and tedious process and the patient is apt to lose a lot of flesh and to get very run down before the discharge dries up. If the discharge be not sufficiently free and the temperature still keeps up, then, an aspirating needle should certainly be inserted and when the abscess has been found it should be opened and a drainage tube inserted. Theoretically such a procedure might involve a risk of setting up pneumothorax, but, practically, this does not occur, as the lower part of the lung is consolidated and the adhesions formed between it and the chest wall are sufficient to prevent such an accident occurring.

Case IV.

R. B. English, a schoolmaster, aged 32, had been in the Straits for nine years without a change to a cold/

cold climate. His occupation was sedentary and he never took any exercise, preferring to spend most of his spare time over the card table in the club. He was known as a good trencherman and his allowance of alcohol had always been a liberal one. He had been attended by another medical man for an attack of dysentery in the earlier part of 1903. He was then confined to the house for about a fortnight and made a complete recovery. I saw him first in the beginning of December of the same year when he complained of feeling out of sorts for some days, of loss of appetite, headache, constipation and some pain and tenderness in the right iliac fossa. His temperature then was 101'. The possibility of its being an attack of appendicitis was considered and, he was treated with enemata to clear the bowels and local application of glycerine and belladonna and hot fomentations. This relieved the pain, but as the temperature did not come down purgatives and quinine were given. These seemed to have the desired effect, for on the night of the sixth day his temperature reached normal for the first time. On visiting him next morning, I found him having a severe rigor and his temperature/

temperature had again gone up. More quinine was given but without effect, and three days later I thought the liver dullness was slightly increased. All this time he had complained of nothing which would have drawn attention to his liver. The dullness increased downwards each day and on the sixth day after the rigor, when the edge of the liver could be felt a finger's breadth below the costal margin, I punctured the liver in the seventh intercostal space, in the anterior axillary line and found pus at once. An incision was made, a piece of rib resected, and with the trocar as a guide the abscess was opened and a drainage tube inserted. The discharge was free for the first five days and the temperature kept down, but at the end of that time it went up again, and as the cavity did not now seem to be draining properly, a trocar was inserted from below the costal margin and a counter-opening made alongside it, a second drainage tube was inserted and the abscess cavity washed out twice daily with Boracic lotion. The case was a long and tedious one to treat, as each attempt to use a smaller drainage tube was followed by a rise of temperature, but with the use of a lotion of one drachm of/

of Tr. Iodi in a pint of water, the cavity gradually contracted and was completely healed at the end of ten weeks from the date of the first operation. Amoe~~b~~^ae were found in the discharge repeatedly, till the Boracic Acid lotion was used, after which they could not be detected. This case shows that a long time, certainly ten months, may elapse between the apparent cure of the preceding attack of dysentery and the onset of liver abscess, that there may be few or no symptoms directing attention to the liver and that a rigor may be the first sign of the probability of deep seated suppuration. It furthermore illustrates, that free drainage by a counter-opening may be required to allow the pus to escape and that syringing with stimulating lotions may be necessary to hasten the healing process.

CASE V.

K. E. B. Chinese school-boy, aged 14 years, was first seen on August 8th 1904. He had been ill and treated by native doctors for two months. His illness dated from being run over by a carriage. No history of any previous illness could be obtained. On examination he looked very pale and thin, his pulse was/

was weak and his temperature was 100.5'. An abscess was pointing in the eighth right intercostal space, in the mid axillary line. After much argument, permission was given to open this, but I had to promise that the incision would be as small as possible. Accordingly a very small opening was made and typical liver pus exuded. It was pointed out to the parents how very necessary it was to enlarge the opening and put in a drainage tube, but they would not hear of any further operative treatment, with the result that his temperature still kept up and he gradually sank and died a week later.

Here we have a case of liver abscess apparently due to an injury. It was said that the wheels of a carriage passed over his body and no history of any previous illness could be obtained, but of course it is possible that the boy may have had dysentery before, because the Chinese do not think much of mild attacks of dysentery and use their own native medicines for it.

CASE VI.E

J. R. - an English engine driver, aged 32, had been in the Straits three years. His occupation did not entail much physical exertion and he did not go in for/

for any games. He fed himself well and his favourite drink was beer, of which he consumed a considerable quantity daily. He was a big muscular man and had the appearance of one who took a good deal of alcoholic drink. In September, 1904, he had been off duty for a fortnight, suffering from dysenteric diarrhoea, but had not been troubled in that way since, though the beer always kept his bowels moving freely. I saw him first on Jan. 3rd, 1905, when he came complaining of fever and pain in his right side, consequent upon being caught in a tropical downpour three days before and having to work an hour or two in his wet clothes. He had a rapid pulse, foul furred tongue, and a temperature of 101'. On physical examination, the liver dullness was found to be increased both upwards and downwards, there was pain in the right side on movement and on drawing a deep breath, and there was tenderness on pressure over the liver. He also complained of pain in the right shoulder. He was given calomel and salines and leeches were applied over the liver. Two days after, as there was no improvement in his symptoms, the liver was explored and pus found at the second puncture in the eighth intercostal space/

space in the mid-axillary line. A piece of rib was resected and the abscess cavity drained. Amoebae were found in the pus on the third day after operation. His temperature fell, and he made an uneventful recovery and, after a change to a hill station, was able to resume work at the end of two months.

In this case, evidently the chill consequent on his wetting was sufficient to set up acute hepatitis leading to abscess formation in a man who had suffered from dysentery three months before, and whose liver from the amount of beer he drank, the quantity of nitrogenous food he consumed and a want of physical exercise must have been in a chronically congested state.

CASE VII.

F.S.B.G. aged 43, an Irish civil engineer, had been in the Straits Settlements for seventeen years during which time, with the exception of occasional attacks of "fever" probably malarial in origin, he had enjoyed good health. He had always led an active outdoor life as his profession necessitated and had also taken a considerable amount of exercise in the form of golf, tennis and riding. He believed in feeding himself/

himself well, and also that a free consumption of alcohol was necessary to keep himself fit in the tropics, so his allowance for several years had been the equivalent of about half a bottle of whisky daily.

He came to see me first on Feb. 10th, 1905, saying that he had been suffering from diarrhoea for three days, that he felt uncomfortable in his stomach and that he was passing loose motions with a little blood stained mucus. He treated the matter lightly and asked for a dose of castor oil and some laudanum to take after the oil had acted. These remedies were given him. He was advised to keep on a purely milk diet and he promised to let me know the result. Two days later he sent for me, and reported that the symptoms were still much the same, and that he thought he had better stay at home for a day or two. A typical dysenteric motion was shown to me, and he said that all his motions for the last two days had been like this one. His tongue was furred, he had no appetite, he looked seedy and out of sorts and he complained of tenderness on pressure along the line of the colon. His temperature was 100' F. After a mustard plaster to his Epigastrium, and thirty minims of/

of Tr. Opii, Ipecacuanha powder was administered but he vomited it all within a quarter of an hour and absolutely refused to take any more. He was accordingly put on Mag. Sulph. one drachm in one ounce of water every four hours and his colon was washed out twice daily with Boracic Acid lotion. This relieved his symptoms, but small blood stained flakes of mucus continued to appear in the washings from his colon. His temperature fluctuated but did not fall to normal and on Feb. 18th it was noticed that his liver dullness was slightly increased downwards, though he complained of no pain, either in the region of that organ, or in his right shoulder. Pressure over the liver, both with the patient lying down and sitting up, failed to elicit any tenderness. On Feb. 20th as the liver dullness was gradually increasing, it was decided to explore. Accordingly chloroform was administered by an assistant, and I proceeded to puncture the liver with the needle of an aspirator. Pus was found at the first attempt. An incision was made alongside the needle in the seventh intercostal space, in the anterior axillary line, and a pair of forceps with the needle as a director pushed into the abscess cavity. As the space between the ribs seemed hardly sufficient for good drainage, a piece of the eighth/

eighth rib was excised to give plenty of room. His temperature fell to normal soon after the operation, the abscess drained freely and the discharge rapidly diminished in quantity. The dysentery was much better - he was passing partially formed stools though the enema which was now given once daily still showed a few flakes of mucus occasionally tinged with blood, and I was congratulating the patient and myself on a probably rapid recovery, when I was hurriedly summoned to his bedside about 8 p.m. on Feb. 28th to be shown a large quantity of blood which he had passed per rectum. He was pale, his pulse was very weak and he showed all the signs of severe internal haemorrhage. He asked for the bedpan again, and passed more pure blood. Assistance was sent for, saline fluid was injected subcutaneously, and haemostatics administered, but in spite of all our efforts, he sank and died within half an hour of my arriving. ~~Post-mortem~~

Post-mortem - the liver abscess was found to be healing, having narrowed down to a sinus little bigger than the drainage tube. Several dysenteric ulcers which were apparently healing were found in the colon which was full of blood, but at the splenic flexure was/

was one which had eaten into a blood vessel, and from this the fatal haemorrhage had occurred. Amoebae had been found in the discharge on the second day after the operation, but none were found post-mortem, either in the abscess cavity or in the dysenteric ulcers.

The above history shows that even the mildest attack of dysentery may be followed by abscess of the liver, and that the abscess may develop rapidly. In this case the operation took place twelve days after the onset of the dysentery. It also proves that the symptoms may not be at all urgent - in this case only a rise of temperature fluctuating from 100° to 101.3° and a slight increase in liver dullness pointed to liver abscess, - and that one should give a very guarded prognosis so long as there are any signs that the dysentery is still active.

CASE VIII.

H. H. the Rajah of P ---, a native state, some 18 hours by a small steamer from Penang, sent for me to see him on Dec. 2nd. 1905. I found him to be a powerful, well-built Malay, aged 42, who had not followed the dictates of the Mohammedan religion too strictly.

He had a considerable harem, and had indulged freely in whisky for some years. He had suffered from several attacks of dysentery, and now complained that he had been confined to his palace for ten days with fever, and acute pain in his right side, extending up to his right shoulder. On examination, he was found to have a temperature of 101.5° and his pulse was rapid. His tongue was furred, and a motion he had passed that morning showed mucus and blood mixed with the faeces. His liver extended downwards half way to his umbilicus, but the dullness was not increased upwards. I advised an exploration of his liver and after much discussion permission to explore, and if necessary to operate was given. I returned the same evening to Penang to fetch an anaesthetist, nurse, instruments, and dressings. On re-arrival at Perlis 40 hours later we were shown a stool which the patient had passed three or four hours before. It consisted almost entirely of liver pus, so apparently the abscess had burst into the bowel. Hoping that this would relieve his symptoms we waited for 48 hours, but as his temperature did not come down and as his general condition showed no signs of improvement we decided/

decided to operate. Under chloroform a needle was pushed into the liver an inch below the costal margin, and pus was found at once. An incision was then made through the skin, forceps pushed along the needle and a drainage tube introduced into a large abscess cavity. This made a free exit for the pus, which poured out of the tube, and next morning his temperature was normal. It was essential that I should return to Penang next day, so I left the nurse in charge of the case, with full directions as to the dressing of the wound and the general care of the patient. I was kept informed by telegram twice daily as to his condition. On the third day the nurse reported that the patient's temperature was going up again, so I returned to Perlis as speedily as possible, to find that the patient was not so well, and that the discharge from the drainage tube had a peculiar acid smell and contained curds of milk. Evidently, what had occurred was, that the perforation had taken place high up in the duodenum, so that the stomach contents passed through the opening into the abscess cavity, and were discharged through the drainage tube. No further operative interference was allowed and in spite of washing out with Boracic lotion three times a day, the temperature kept up, the discharge/

discharge of curdled milk went on and the patient gradually sank and died 16 days after the operation.

No post-mortem was allowed. The question at once arises, as to whether it would not have been better to have waited longer before operating, to see whether the drainage through the duodenum would not have been sufficient. At the end of 48 hours the temperature showed no signs of coming down, and as it was impossible to move him to Penang or for either the anaesthetist or me to remain longer in Perlis it was decided to operate at once. The free discharge when the abscess was opened, and the large size of the cavity when explored with the finger, showed that it was unlikely, that the drainage effected by the communication with the bowel would be sufficient to allow the abscess to heal. The acid nature of the discharge indicated that the perforation had occurred high up in the duodenum not far from the pyloric end of the stomach. Drainage from that point would not be so effective as from an opening made below the costal margin into the lower part of the abscess cavity.

CASE IX.

G. H. C. aged 30, an English planter, had been in the colony six years and had enjoyed excellent health till September, 1906, when on opening up some new land, he contracted such a very severe attack of malaria that he had to be sent to one of the hill stations in Ceylon to recruit. He returned to Penang on December 7th much better. I travelled with him on the same boat from Ceylon to Penang and he seemed to have got rid of his malaria completely. A fortnight after his return he was attacked with dysentery of a subacute type. He attributed the attack to drinking water from a stream on his estate when he was very thirsty and could not wait till he got back to his bungalow. His motions were on an average four or five a day, loose and mixed with a varying quantity of blood and mucus. He refused to lie up as his planting operations were at a critical stage, and could not be delayed, so he treated himself mainly with chlorodyne and a patent dysentery mixture much used locally and dieted himself to a certain extent. He was one of our leading athletes, took plenty of exercise apart from his work on the estate and practically never drank more than two glasses of whisky daily.

His/

His dysentery continued, now a little better, now a little worse, till Feb. 6th, 1907 when I saw him again. He looked pale, ill and very thin and said he thought his malaria was coming on again as he sometimes felt chilly - not a distinct rigor - and that his temperature which he had taken himself was up a little at nights. He had dosed himself freely again with quinine but that had no effect. The dysentery still continued as before. His appetite was poor and he had come to recognise that he must lie up. He was put to bed under observation. It was found that his temperature ranged from 99' to 100' in the morning but went up to 102' at nights, that it was of a distinctly hectic type and that he sweated freely at nights. The liver dullness was increased very slightly upwards behind, so slightly that in consultation opinions varied as to whether it was really increased or not. There was no increase downwards. A blood count was made, in the hope that it would help the diagnosis, and a leucocytosis of 26,500 was found to exist. Acting on this evidence the liver was explored and at the fifth puncture, through the eighth intercostal space, in a line with the angle of the scapula, pus was found at a considerable depth. With the trocar still in situ, an/

an incision was made, a piece of rib excised, and the opening into the abscess cavity enlarged with forceps. There was very free haemorrhage from the liver, but this was controlled by packing round the drainage tube with gauze. The abscess drained freely and the patient made a steady and uneventful recovery.

Amoebae were found in the discharge on the second day after the operation. In this case, the blood count was a very distinct help in diagnosis. The enlargement of the liver on percussion was so very slight as to be questioned by one of the three consultants, but the history of dysentery, the hectic temperature and the leucocytosis made us persist in puncturing the liver till pus was found.

CASE X.

M. H. an Englishwoman, a professional nurse, aged 44, had been in the tropics for six years without a change to a cold climate. She was a very stout unhealthy looking woman, and indulged in alcohol pretty freely, champagne being her favourite beverage. She was said to have had two attacks of typhoid fever, one in youth and one four years before. She had an attack of dysentery in Burmah, lasting a month, about a year before her present illness. Whilst dining/

dining with some friends on Jan. 10th, 1907, she felt chilly and then feverish and had to leave the table to go home to bed. I saw her the following day, when she had a temperature of 101.5' and complained only of a feeling of general malaise and headache. There were no definite physical signs and she was given a purgative and a diaphoretic mixture. In spite of this treatment her condition did not improve, and her temperature continued to fluctuate between 100' and 102.5'. Careful physical examination failed to reveal anything abnormal. A week after the beginning of her illness, some crepitations were heard at the base of the right lung but no dullness could be discovered. On the tenth day, the percussion note at the base of the right lung was impaired and after consultation with two other medical men it was decided to explore the liver. This was done and pus was found at the fourth attempt, about three inches from the skin surface, in the eighth right intercostal space in the posterior axillary line. As her pulse and general condition were not at all good, Cantlie's method of inserting the drainage tube was employed. The dressings were changed twice daily, but there was never much/

much discharge. Amoebae were found on the third day after operation. Her temperature kept up, her general condition steadily became worse, and she died five days after the operation.

Post-Mortem. Old scars of dysenteric ulcers were found in the colon. There was an abscess the size of a small orange in the upper part of the right lobe of the liver. The abscess cavity was ragged and sloughing and contained a fair quantity of pus. The heart showed fatty degeneration. This is the only case of liver abscess I have seen in a woman. She had a distinct history of dysentery and undoubtedly indulged too freely in alcohol. She complained of no symptoms which attracted attention to the liver, and it was only the crepitations at the base of the right lung, and finally the impaired note there, which gave a clue to the real nature of the disease.

Her general condition was so bad that any extensive operation was dreaded, and in view of this, and the depth at which the pus was found, it was decided to try Cantlie's method of inserting the drainage tube. The result was not satisfactory. The drainage was not so perfect as it should have been, and /

and I should certainly not use his method in any case in which the open operation could be done, without increasing the risk to the patient.

CASE XI.

L.M.C. A Chinese merchant, aged 45, was first seen on Oct. 7th, 1907. He complained of pains in the left side of his chest and a troublesome cough which prevented^{in him} from sleeping. His temperature was 101.5', his respirations 30 and his pulse 104. He had been exposed to cold through sleeping on the deck of a ship two nights before I saw him. On examination there was found to be dullness at the base of the left lung. The breath sounds were audible, not bronchial in character, but there were occasional râles. The hacking cough and the severe pain in the left side necessitated hypodermic injections of morphia at night to give him sleep. On Oct. 12th the dullness at the left base was well marked and the breath sounds were not so clearly heard. After consultation, the left side of the chest was explored with a hollow needle, but no fluid was found. On Oct. 14th a violent fit of coughing was followed by the expectoration of a considerable quantity of blood stained/

stained sputum. On examination this turned out to be liver pus. He was urged to submit to an operation but he persistently refused to do so, and the cough and expectoration, accompanied by irregular fluctuations of temperature, continued for two and a half months. His most urgent symptoms were relieved by smoking opium. The expectoration gradually diminished in quantity, his general condition improved and at the end of three months he was quite well.

In this case, there was evidently an abscess in the left lobe of the liver setting up catarrhal conditions at the base of the left lung and finally bursting into the lung, through which the pus escaped till finally the cavity contracted and healed. He was an abstemious man, allowing himself only about an ounce of brandy as an appetiser before his evening meal. There was no history of recent dysentery, but he had been troubled with slight diarrhoea up to about a year before the present illness, when, on the advice of a friend, he began to smoke opium in small quantities and this stopped the diarrhoea. The diarrhoea was probably dysenteric in character though
no /

no history of blood in the motions could be obtained. The exciting cause of the abscess was the chill he caught whilst sleeping on deck in a rain storm. No amoebae were found in the expectoration, but the pus presented the typical appearance of the discharge from an abscess of the liver.

CASE XII.

T. K. C. aged 40, a Chinese supercargo on board a local steamer, seen in Oct. 1907, had been in bad health for six or seven months. He had suffered from chronic dysentery for years, and found that the only thing which relieved his symptoms was smoking opium. His consumption of the drug increased, till finally as a result of this and his continued bad health, he had to leave his ship and stay at home. He had never drunk to excess, his allowance being half a glass of brandy as an appetiser before his evening meal. He presented the typical appearance of an opium-smoker, pallor, sunken eyes with small pupils, general emaciation, dry skin and blue lips. His tongue was dry and furred, his pulse weak and his temperature 99.5'. Physical examination showed no sign of disease in any of his organs except his liver, which was/



was markedly enlarged downwards, reaching almost to the umbilicus. The swelling was tender on pressure and gave one a feeling of deep seated fluctuation. He was urged to submit to exploration of his liver, and, if necessary, to operation, but he absolutely refused to allow anything to be done. I attended him for three days and, during that time, he gradually became weaker. On going to see him on the fourth morning, I was told he had died during the night, after having vomited or coughed up a large quantity - said by his relatives to be about a pint - of chocolate coloured matter, evidently from their description liver pus. The abscess had burst, either into the stomach or into the lung, and it is doubtful whether any operation could have saved him in his emaciated and exhausted condition.

CASE XIII.

S. J. H. a Chinese clerk, aged 28, was first seen by me on June 16th, 1908. He had been ill and confined to the house for two months, during which time he had been treated by Chinese doctors. On inspection, he presented the appearance of a man suffering from phthisis. He was pale, much emaciated and had a troublesome cough which kept him awake at nights.

He/

He complained of a swelling in his right side which did not **cause** him much pain, of general weakness and profuse sweating at nights. He had an attack of acute dysentery in 1906, and had since suffered from diarrhoea after any indiscretion in diet. For the last three years he had drunk at least half a bottle of brandy daily, but his appetite was poor and he had never overfed himself. Physical examination showed enlargement of the liver dullness downwards, for two inches below the costal margin. The swelling was tender on pressure and felt doughy. The other organs were healthy, except that at the base of the right lung behind, there were some crepitations indicating a condition of catarrh, probably set up by the proximity of the liver enlargement. This accounted for the troublesome cough. His temperature chart was distinctly hectic in type. Two days later, after much argument and persuasion, I was allowed to explore the liver and found pus at once in the seventh intercostal space, in the anterior axillary line. The opening was enlarged, a piece of rib excised and a drainage tube put in. An enormous quantity of pus escaped during the first 24 hours, his temperature came down and the cough was less troublesome. Amoebae were/

were found in the pus on the fourth day after the operation. He continued to improve for a week, but then his temperature began to go up again in the evening, and evidently the drainage was not free enough, so under light anaesthesia a second opening was made into the abscess cavity from below the costal margin. Irrigation with corrosive sublimate lotion 1-5000 was carried out daily, taking care to remove the last traces of the mercurial lotion with a stream of boiled water. This treatment was adopted because I was sure, that owing to his surroundings and the difficulties in connection with the dressing of the wounds, a mixed infection with different kinds of micro-organisms had taken place, and corrosive sublimate lotion seemed more likely to be of use in such a case than boracic lotion. After the second operation the patient made an uneventful though slow and tedious recovery. Each attempt to shorten the drainage tubes or to use smaller ones was followed by a rise of temperature, and it was ten weeks from the time of the first operation till both wounds were soundly healed. He has put on over two stones in weight and now looks a fat, healthy and prosperous Chinaman./

Chinaman. This case illustrates the necessity for very free drainage, if necessary by more than one incision and the fact that if mixed infection takes place the healing process is slower than in cases where one can be sure of reasonably aseptic surroundings.

CASE XIV.

K. M. - a Japanese photographer, aged 28, had been in poor health for some months before I saw him in May, 1909. He had been treated by native doctors for dysentery, but he had not been able to get rid of the disease which had assumed a chronic form. At first glance he looked as if he might be suffering from phthisis. He was pale and much wasted and looked very weak. His temperature was 99.6°. On physical examination his heart and lungs were found to be healthy, but his liver was enlarged two inches below the costal margin. In view of the history of chronic dysentery an exploration of the liver was advised. He readily consented to this and the following day, all preparations having been made for operation, pus was found at the first puncture below the costal margin. An incision was made and a pair of forceps/

forceps pushed along the canula into the abscess cavity from which a great quantity of pus escaped. A drainage tube was inserted and the wound dressed. A large quantity of pus, in which amoebae were found, continued to be discharged and at the end of ten days as the abscess cavity did not seem to be contracting it was syringed out twice daily with a lotion containing one drachm of Tr. Iodi to a pint of boiled water. This helped the healing process and the discharge diminished in amount. A smaller tube was inserted and finally at the end of six weeks the opening closed. The dysentery was treated by milk diet and flushing out the colon twice daily with boracic acid lotion. When last seen, March, 1910, the patient was strong and well and following his occupation. In this case we had a long standing large abscess. From the amount of pus discharged it seemed as if there could be very little liver tissue left, but in spite of this there were few symptoms which would have directed one's attention to the liver. He did not complain of any pain either in the liver or in the right shoulder, but his wasted almost cachectic appearance along with his history of chronic dysentery immediately made one suspicious of the possibility of liver/

liver abscess. Once the iodine lotion was used the discharge lessened considerably and the abscess cavity contracted. I have found this lotion useful in other cases and it is largely used in the Government Hospitals in the Straits Settlements in such cases.

CASE XV.

L. E. H. a Chinese coolie, aged 35, had suffered from several attacks of dysentery, but had never drunk anything more intoxicating than native samshu and that only in very small quantities. His occupation exposed him to sun and rain and his food was poor. He had been unable to work for three months before he came to see me in June, 1909. He complained of pain and a feeling of weight in his right side and of general weakness. He was anaemic and thin and walked into my room with his hands supporting the right side of his abdomen. His pulse was weak and his temperature 99'. On physical examination the liver dullness was found to extend downwards a hand's breadth below the costal margin, and in the middle of this area of dullness an abscess was pointing and looked as if it would burst very soon. An incision was made without any anaesthetic and large quantities of chocolate coloured liver pus escaped. A drainage tube was inserted and the wound dressed regularly. Amoebae were found/

found in the pus on the third day after the operation. The abscess healed rapidly without any trouble, the patient put on flesh and at the end of six weeks he was fit for work again. This was evidently a long standing abscess with no very urgent symptoms and no great rise of temperature, but with gradual wasting and deterioration in strength. The liver had become firmly adherent to the abdominal wall and the pus had burrowed, till the abscess was on the point of bursting through the skin.

CASE XVI.

H. W. - an Englishman, aged 27, the editor of a newspaper, had been in the country three and a half years and during this time he had always lived well both as regards food and drink of which his allowance was a liberal one. He never took exercise. In January, 1908, he had an attack of acute dysentery which confined him to his house for five weeks. He was apparently quite cured and resumed work. Just a year later (Jan. 1909) he went on an expedition up country and returned to Penang suffering from fever. His blood was examined and malarial parasites were found. He was given quinine hypodermically till no more/

more parasites could be found in the blood. His fever still continued and he developed all the symptoms of enteric fever. Widal's reaction was positive. Accordingly he was treated for typhoid fever. Fifteen days after his illness began it was noticed that his liver dullness was increasing downwards. This increase continued daily, till on the 20th day it was found to be three finger breadths below the costal margin. There was no increase upwards. The swelling was tender on pressure, and he complained of pain in his right side when he turned round in bed and of pain in his right shoulder. A consultation was held and in view of the history of dysentery a year before and his high temperature it was decided to explore the liver. This was done the following day under an anaesthetic, when the liver was punctured in ten different places without finding pus. We were disappointed, as we felt sure there must be pus somewhere in such a large liver, and a very guarded prognosis was given. After the exploration the patient was greatly collapsed and required brandy and strychnine hypodermically; indeed for twelve hours he was in a most critical condition. Having got over the/

the shock he quickly recovered; the swelling of the liver rapidly decreased, till on the fifth day after the exploration, the edge of the liver could just be felt under the costal margin, and his temperature returned to normal on the thirty fifth day of his illness. Here, then, was a complicated case. First malaria as proved by the presence of parasites in the blood, secondly typhoid fever as evidenced by Widal's reaction, he never having had typhoid before and thirdly great congestion of the liver, the remarkable point about which was its rapid subsidence after exploration. With the history of a previous attack of dysentery, our knowledge of the patient's mode of life, the continued fever and the enlargement of the liver everything pointed very strongly to the probability of abscess of the liver. Most likely if the condition had been allowed to go on an abscess would have developed, and though the shock of the exploration on his weak condition gave rise to great anxiety for twelve hours, the treatment proved most efficacious. In another similar case, however, I should not be inclined to puncture the liver too often, but would rest content with six insertions of the needle at most.

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